



Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

() Preliminary Specification

(V) Final Specification

Module	19" WXGA+ Color TFT-LCD
Model Name	M190PW01 V6 Open Cell

Customer	Date
Approved by	
Note: This Specification is subject to change without notice.	

Approved by	Date
<u>ChiYi Wu</u>	August 7, 2011
Prepared by	Date
<u>Arnold Hsu</u>	August 7, 2011
Desktop Display Business Group / AU Optronics corporation	



Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

Contents

1.0 Handling Precautions.....	4
2.0 General Description	5
2.1 Display Characteristics	5
2.2 Optical Characteristics.....	5
3.0 Functional Block Diagram	8
4.0 Absolute Maximum Ratings.....	9
4.1 TFT LCD Module	9
4.2 Absolute Ratings of Environment.....	9
5.0 Electrical characteristics	10
5.1 TFT LCD Open Cell.....	10
5.1.1 Power Specification.....	10
5.1.2 Signal Electrical Characteristics	11
6.0 Signal Characteristic	12
6.1 Pixel Format Image	12
6.2 The input data format.....	12
6.3 Signal Description.....	13
6.4 Timing Characteristics.....	15
6.5 Timing diagram.....	16
6.6 Power ON/OFF Sequence	17
7.0 Connector & Pin Assignment.....	18
7.1 TFT LCD Module	18
7.1.1 Pin Assignment	18
8.0 Reliability Test	19
9.0 Mechanical Characteristics.....	20

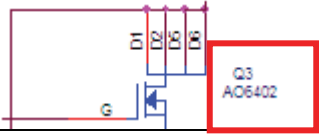
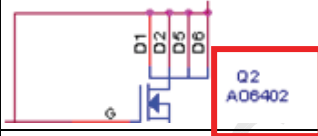
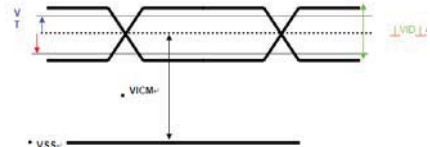
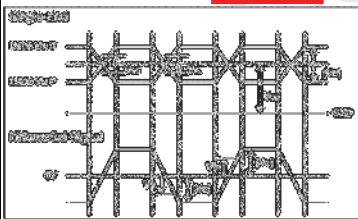
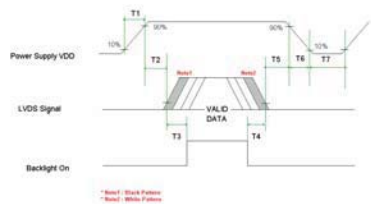
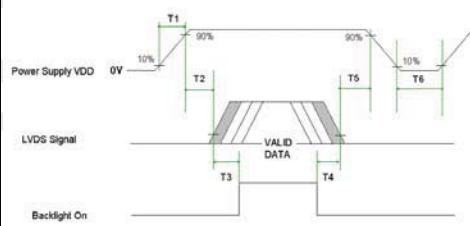


Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

Record of Revision

Version and Date	Page	Old description	New Description	Remark
0.1 2010/01/29	All	First Edition for Customer	N/A	
1.0 2010/03/25	All	Fianl Spec for Customer	N/A	
1.1 2010/05/13	12	Correct Power Specification table 		
1.1 2010/05/13	13	Update LVDS Signal Waveform 		
1.1 2010/05/13	21	Update Power ON/OFF Sequence 		
1.5 2010/01/07	22		Add note in 6.6 Power ON/OFF Sequence: Note 1: Insert a black pattern Note 2: Insert a white pattern after valid data and last until VDD falls to 10%	



Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

1.0 Handling Precautions

- 1) Since front polarizer is easily damaged, pay attention not to scratch it.
- 2) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
- 3) When the cell surface is soiled, wipe it with absorbent cotton or other soft cloth.
- 4) Since the cell is made of glass, it may break or crack if dropped or bumped on hard surface.
- 5) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.
- 6) Do not press or pat the panel surface by fingers, hand or tooling.
- 7) Please handle TFT cell with care. The FPCs can only sustain for quite limited stress.
- 8) The cell package tray is packed in clean room. Please do pack & unpack it in clean room.
- 9) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT cell.
- 10) Pls avoid touching COF position while you are doing mechanical design.
- 11) When storing modules as spares for a long time, the following precaution is necessary:
Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.



Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

2.0 General Description

This specification applies to the 19 inch-wide Color TFT-LCD Module M190PW01.

The display supports the WXGA+ (1440(H) x 900(V)) screen format and 16.7M colors(RGB 6-bits+HiFRC). All input signals are 2-Channel LVDS interface compatible. This module does not contain an inverter board for backlight.

2.1 Display Characteristics

The following items are characteristics summary on the table under 25°C condition:

ITEMS	Unit	SPECIFICATIONS
Screen Diagonal	[mm]	481.4(18.9")
Active Area	[mm]	408.24 (H) x 255.15(V)
Pixels H x V		1440x3(RGB) x 900
Pixel Pitch	[um]	283.5 (per one triad) x283.5
Pixel Arrangement		R.G.B. Vertical Stripe
Display Mode		TN Mode, Normally White
Optical Response Time		1000 (Typ.)
Nominal Input Voltage VDD	[msec]	5ms (Typ., on/off)
Power Consumption (VDD line)	[Volt]	+5.0 V
Cell weight	[Watt]	15.5W (Typ) (without inverter, all black pattern)
Electrical Interface	[Grams]	536 (Typ)
Support Color		Dual channel LVDS
Surface Treatment		16.7M colors (RGB 6-bit + Hi_FRC)
Cell transmittance		Anti-Glare, 3H
Cell thickness		5.8%, (base on CCFL type lamp)

2.2 Optical Characteristics

The optical characteristics are measured under stable conditions at 25°C:

Item	Unit	Conditions	Min.	Typ.	Max.	Note
Response Time	[msec]	Raising Time (T_{rR})	-	3.6	5.7	1, 2
		Falling Time (T_{rF})	-	1.4	2.3	
		Raising + Falling	-	5	8	
Crosstalk (in 60Hz)	[%]				1.5	3
Flicker	dB				-20	4



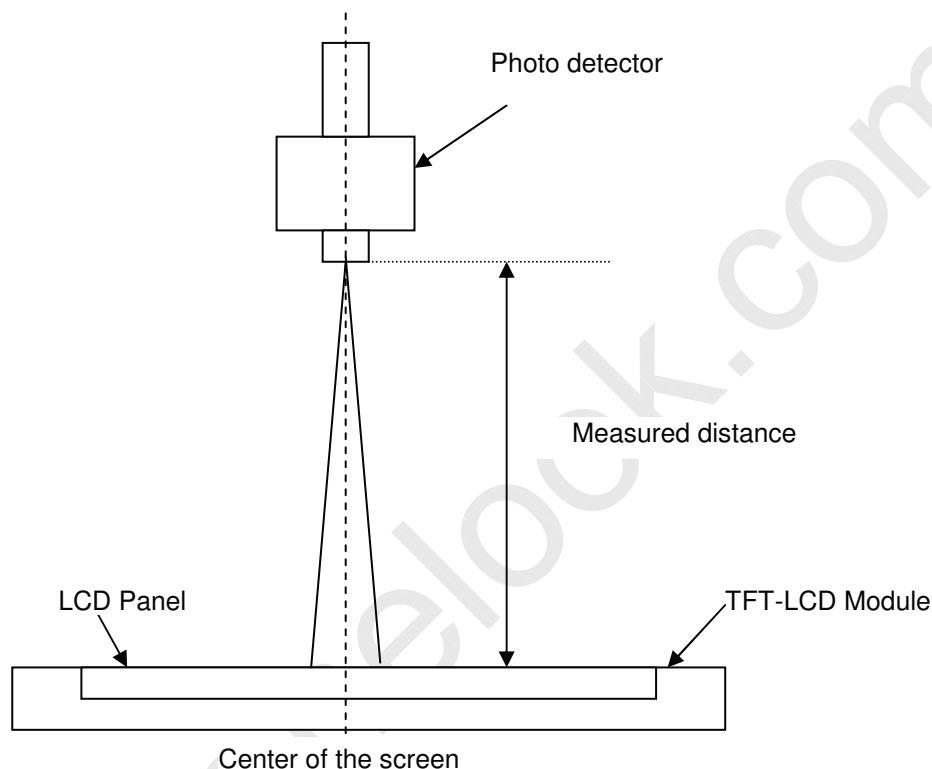
Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

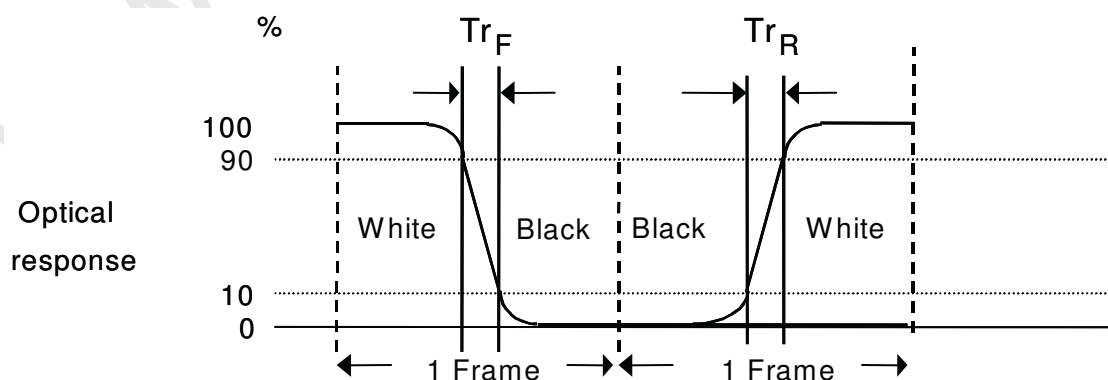
Note 1: Measurement method

The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring (at surface 35°C). In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a stable, windless and dark room.



Note 2: Definition of Response time measured by Westar TRD-100A

The output signals of photo detector are measured when the input signals are changed from "Full Black" to "Full White" (rising time, Tr_R), and from "Full White" to "Full Black" (falling time, Tf_F), respectively. The response time is interval between the 10% and 90% (1 frame at 60 Hz) of amplitudes.



$$Tr_R + Tf_F = 5 \text{ msec (typ.)}$$



Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

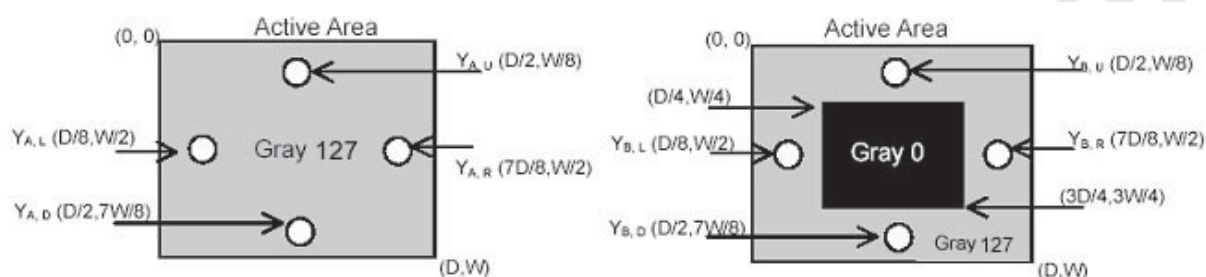
Note 3: Crosstalk is defined as below and measured by TOPCON SR-3

$$CT = | YB - YA | / YA \times 100 (\%)$$

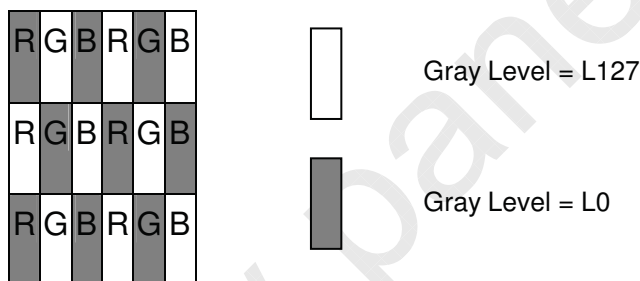
Where

YA = Luminance of measured location without gray level 0 pattern (cd/m2)

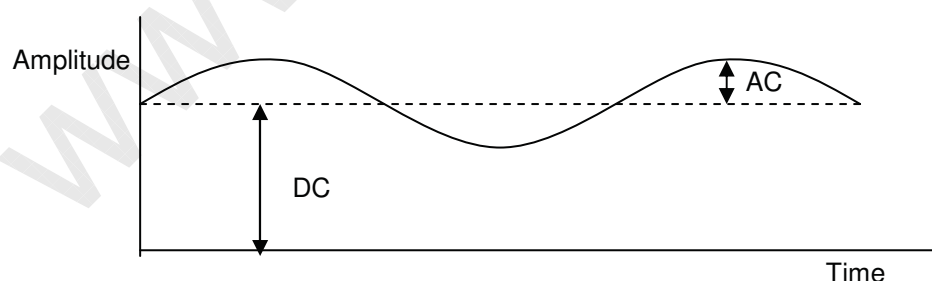
YB = Luminance of measured location with gray level 0 pattern (cd/m2)



Note 4: Test Pattern: Subchecker Pattern measured by TOPCON SR-3



Method: Record dBV & DC value with TRD-100



$$\text{Flicker (dB)} = 20 \log \frac{\text{AC Level (at 30 Hz)}}{\text{DC Level}}$$



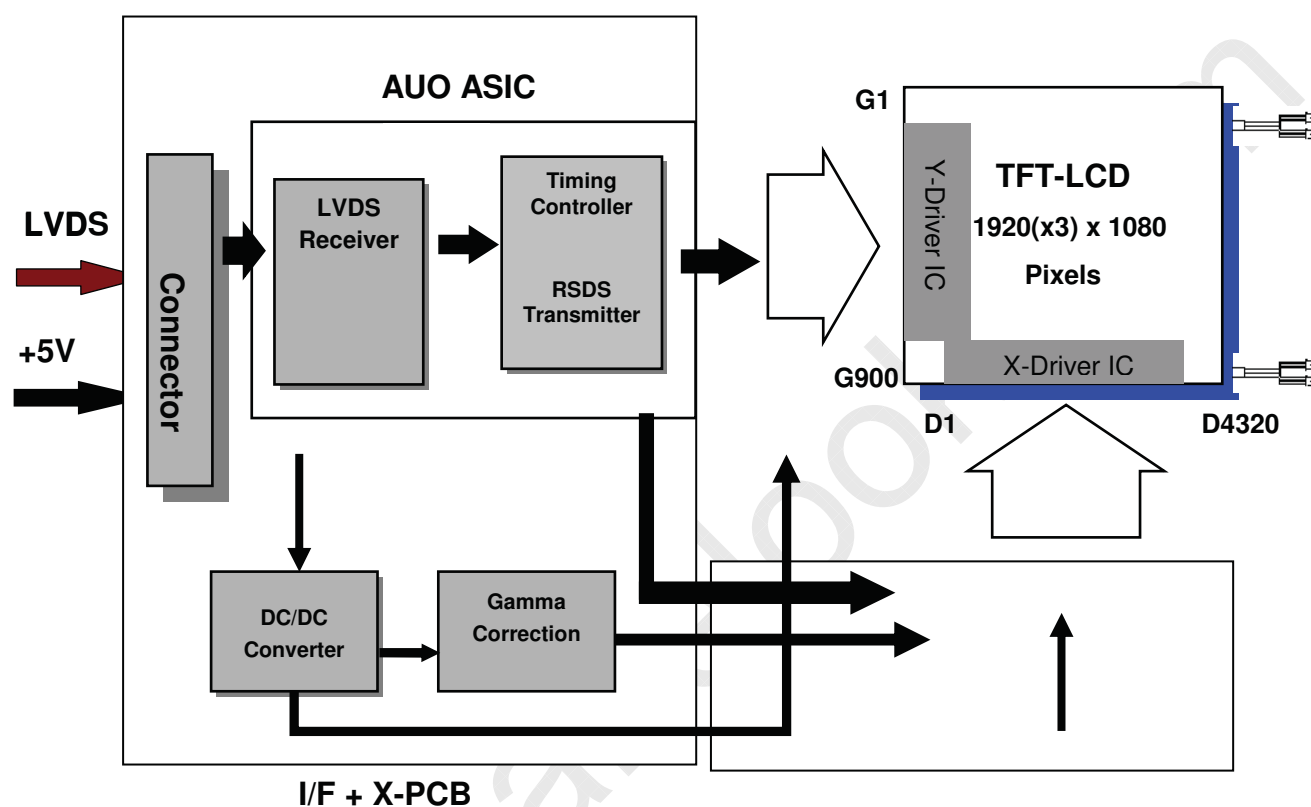
Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

3.0 Functional Block Diagram

The following diagram shows the functional block of the 19.0 inch Color TFT-LCD Open Cell:



I/F PCB Interface:

FI-XB30SSL-HF15(JAE)/MSBKT2407P30HB(信盛)

YEON HO 35001HS-02L

Mating Type: 35001WR-02LP

Mating Type:

FI-X30HL-T(JAE)(Locked Type)



Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

4.0 Absolute Maximum Ratings

Absolute maximum ratings of the module are as following:

4.1 TFT LCD Module

Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	VDD	0	6	[Volt]	Note 1,2

4.2 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Operating Temperature	TOP	0	+50	[°C]	Note 3
Glass surface temperature (operation)	TGS	0	+65	[°C]	Note 3, Note 4
Operation Humidity	HOP	5	90	[%RH]	Note 3
Storage Temperature	TST	-20	+60	[°C]	
Storage Humidity	HST	5	90	[%RH]	

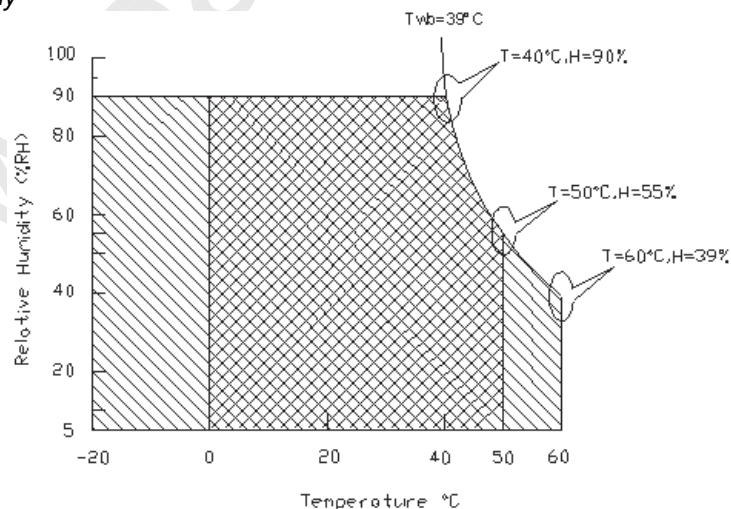
Note 1: With in Ta (25°C)

Note 2: Permanent damage to the device may occur if exceeding maximum values

Note 3: Temperature and relative humidity range are shown as the below figure.

1. 90% RH Max (Ta ≤39°C)
2. Max wet-bulb temperature at 39°C or less. (Ta ≤39°C)
3. No condensation

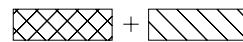
Note 4: Function Judged only



Operating Range



Storage Range





Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

5.0 Electrical characteristics

5.1 TFT LCD Open Cell

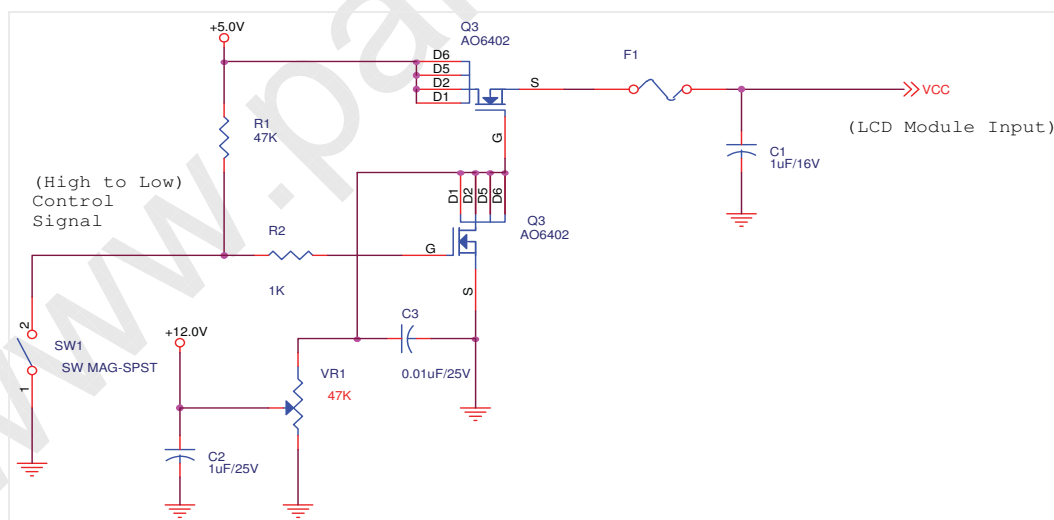
5.1.1 Power Specification

Input power specifications are as following:

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
VDD	Logic/LCD Drive Voltage	4.5	5.0	5.5	[Volt]	+/-10%
IDD	Input Current	-	0.9	1.1	[A]	VDD= 5.0V, All Black Pattern At 60Hz
PDD	VDD Power	-	4.5	5.5	[Watt]	VDD= 5.0V, All Black Pattern At 60Hz , Note 1
IRush	Inrush Current	-	-		[A]	Note 2
VDDrp	Allowable Logic/LCD Drive Ripple Voltage	-	-	250	[mV] p-p	VDD=5.0, All black pattern at 60Hz

Note 1: Measurement conditions:

The duration of rising time of power input is 470us.

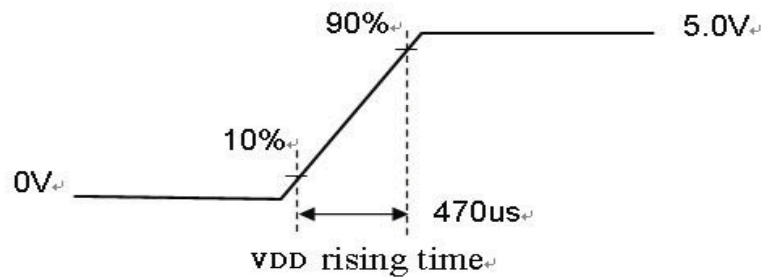




Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION



5.1.2 Signal Electrical Characteristics

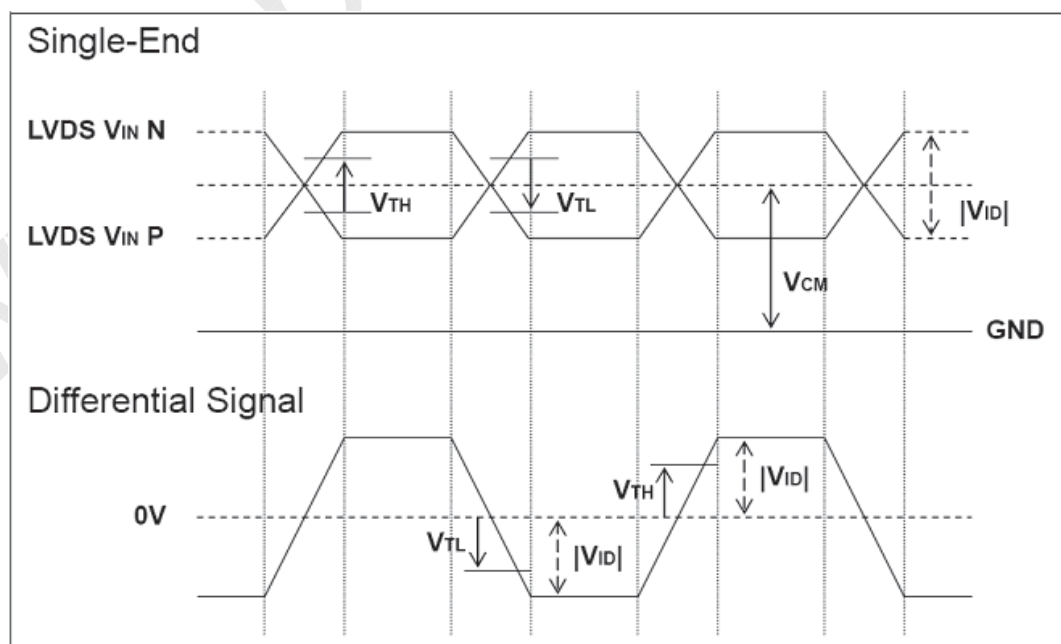
Input signals shall be low or Hi-Z state when Vin is off

It is recommended to refer the specifications of SN75LVDS82DGG (Texas Instruments) in detail.

Each signal characteristics are as follows;

Symbol	Parameter	Min	Typ	Max	Units	Condition
VTH	Differential Input High Threshold	-	-	100	[mV]	VICM = 1.2V Note
VTL	Differential Input Low Threshold	-100	-	-	[mV]	VICM = 1.2V Note
VID	Input Differential Voltage	100	400	600	[mV]	Note
VICM	Differential Input Common Mode Voltage	1.0	1.2	1.5	[V]	VTH/VTL = ± 100mV Note

Note: LVDS Signal Waveform





Product Specification

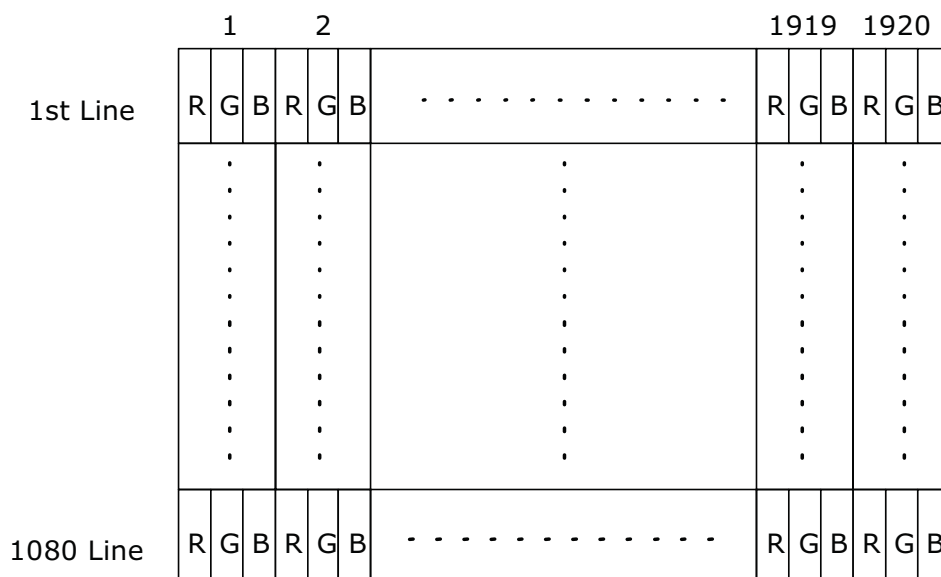
M190PW01 V6 open cell

AU OPTRONICS CORPORATION

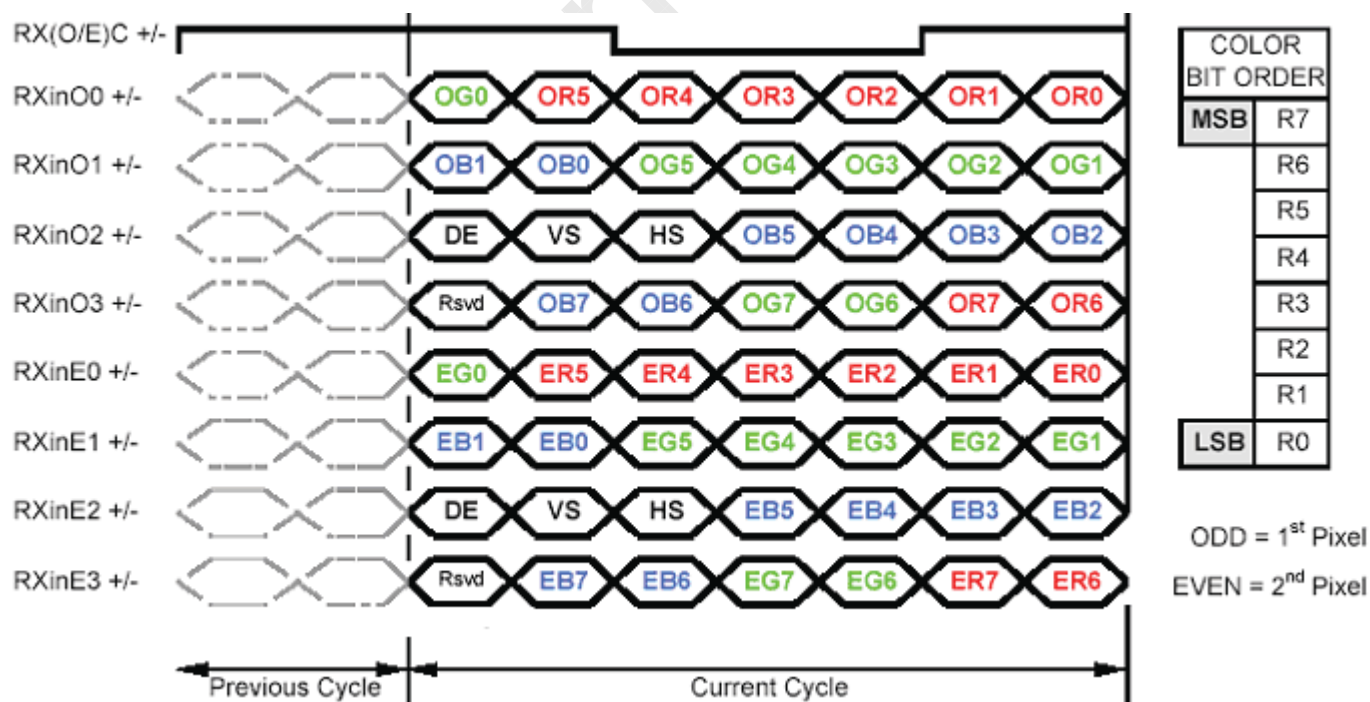
6.0 Signal Characteristic

6.1 Pixel Format Image

Following figure shows the relationship of the input signals and LCD pixel format.



6.2 The input data format



Note 1: R/G/B data 7:MSB, R/G/B data 0:LSB O = "First Pixel Data" E = "Second Pixel Data"



Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

6.3 Signal Description

The module using one LVDS receiver SN75LVDS82(Texas Instruments). LVDS is a differential signal technology for LCD interface and high speed data transfer device. LVDS transmitters shall be SN75LVDS83(negative edge sampling). The first LVDS port(RxOxxx) transmits odd pixels while the second LVDS port(RxExxx) transmits even pixels.

PIN #	SIGNAL NAME	DESCRIPTION
1	RxOIN0-	Negative LVDS differential data input (Odd data)
2	RxOIN0+	Positive LVDS differential data input (Odd data)
3	RxOIN1-	Negative LVDS differential data input (Odd data)
4	RxOIN1+	Positive LVDS differential data input (Odd data)
5	RxOIN2-	Negative LVDS differential data input (Odd data,DSPTMG)
6	RxOIN2+	Positive LVDS differential data input (Odd data,DSPTMG)
7	GND	Power Ground
8	RxOCLK-	Negative LVDS differential clock input (Odd clock)
9	RxOCLK+	Positive LVDS differential clock input (Odd clock)
10	RxOIN3-	Negative LVDS differential data input (Odd data)
11	RxOIN3+	Positive LVDS differential data input (Odd data)
12	RxEIN0-	Negative LVDS differential data input (Even data)
13	RxEIN0+	Positive LVDS differential data input (Even data)
14	GND	Power Ground
15	RxEIN1-	Positive LVDS differential data input (Even data)
16	RxEIN1+	Negative LVDS differential data input (Even data)
17	GND	Power Ground
18	RxEIN2-	Negative LVDS differential data input (Even data)
19	RxEIN2+	Positive LVDS differential data input (Even data)
20	RxECLK-	Negative LVDS differential clock input (Even clock)
21	RxECLK+	Positive LVDS differential clock input (Even clock)
22	RxEIN3-	Negative LVDS differential data input (Even data)
23	RxEIN3+	Positive LVDS differential data input (Even data)
24	GND	Power Ground
25	NC	No connection (for AUO test only. Do not connect)
26	NC	No connection (for AUO test only. Do not connect)
27	NC	No connection (for AUO test only. Do not connect)
28	VDD	Power +5V
29	VDD	Power +5V
30	VDD	Power +5V

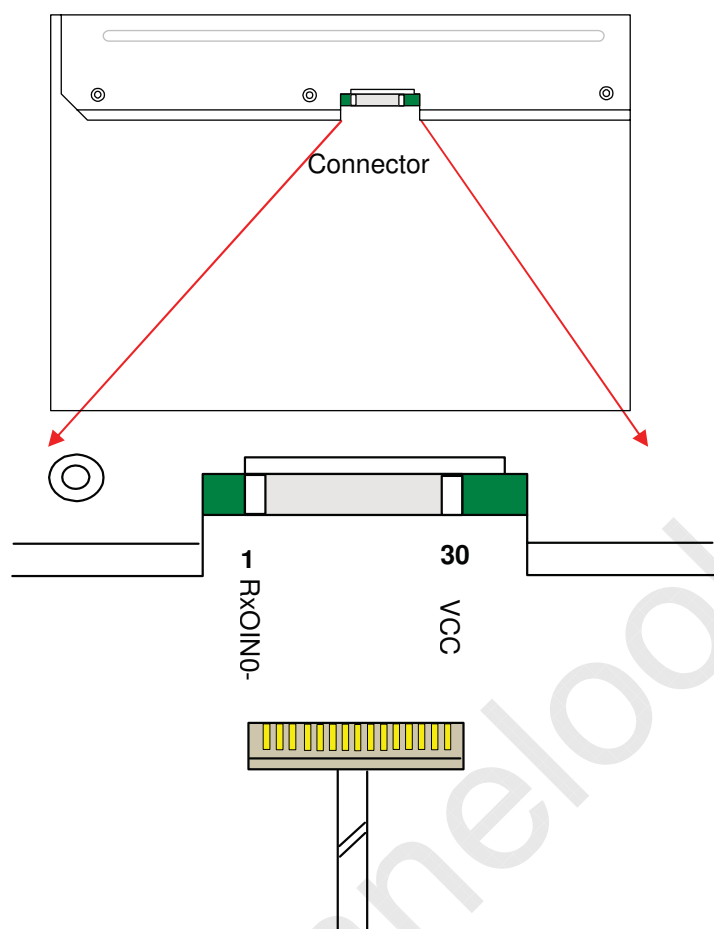


Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

Note1: Start from left side



Note2: Input signals of odd and even clock shall be the same timing.

Note3: Please follow PSWG.



Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

6.4 Timing Characteristics

Basically, interface timing described here is not actual input timing of LCD module but close to output timing of SN75LVDS82DGG (Texas Instruments) or equivalent.

Signal	Item	Symbol	Min	Typ	Max	Unit
Vertical Section	Period	T_v	910	916	2047	Th
	Active	$T_{disp(v)}$	900	900	900	Th
	Blanking	$T_{bp(v)}+T_{fp(v)}+PW_{vs}$	10	16	1147	Th
Horizontal Section	Period	T_h	870	964	2047	Tclk
	Active	$T_{disp(h)}$	720	720	720	Tclk
	Blanking	$T_{bp(h)}+T_{fp(h)}+PW_{hs}$	150	244	1327	Tclk
Clock	Period	Tclk	22.2	21.1	15.4	ns
	Frequency	Freq	42.3	54.1	67.6	MHz
Frame rate	Frame rate	F	50	60	76	Hz

Note : DE mode only

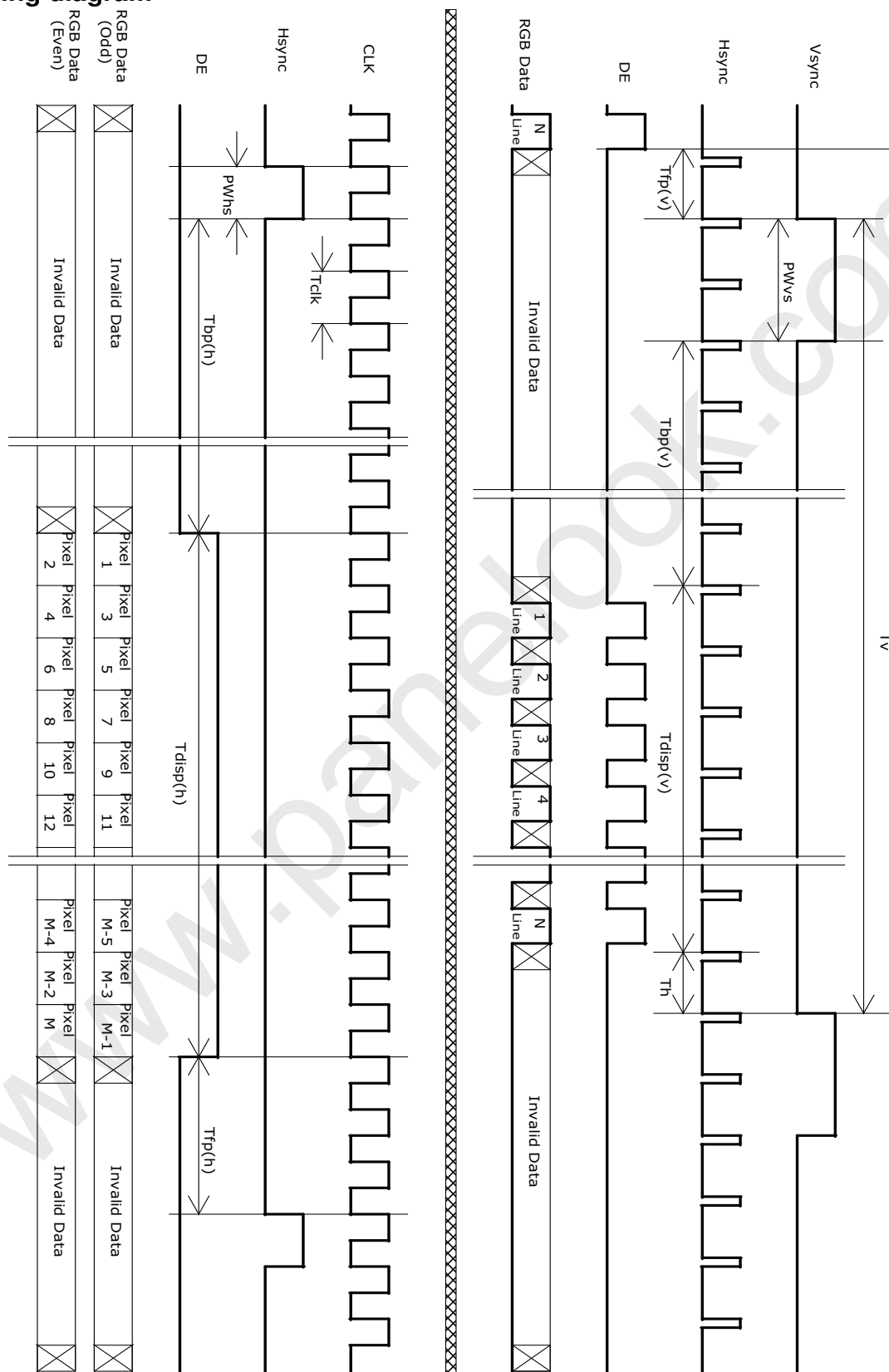


Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

6.5 Timing diagram





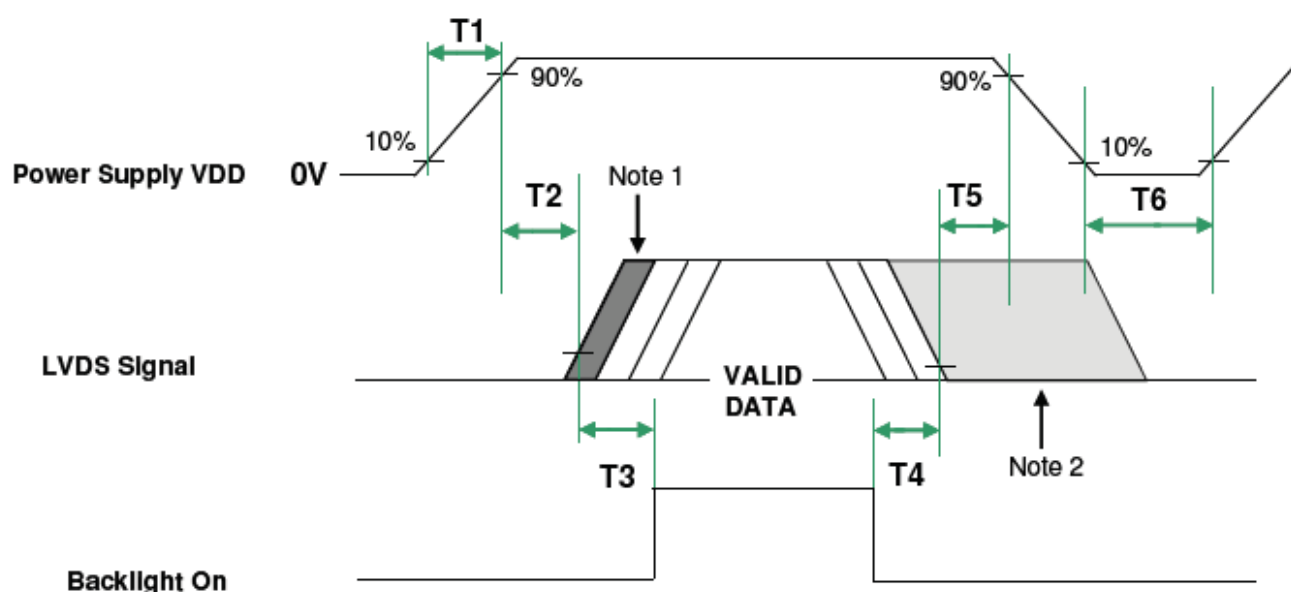
Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

6.6 Power ON/OFF Sequence

VDD power and lamp on/off sequence are as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Note 1: Insert a black pattern

Note 2: Insert a white pattern after valid data and last until VDD falls to 10%

Parameter	Value		Unit
	Min.	Max.	
T1	0.5	10	[msec]
T2	0	50	[msec]
T3	500	-	[msec]
T4	200	-	[msec]
T5	0	50	[msec]
T6	1000	-	[msec]



Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

7.0 Connector & Pin Assignment

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be following components.

7.1 TFT LCD Module

Connector Name / Designation	Interface Connector / Interface card
Manufacturer	JAE or STM(信盛)
Type Part Number	FI-XB30SSL-HF15 MSBKT2407P30HB
Mating Housing Part Number	FI-X30HL-T (Locked Type) FI-X30S-H (Unlocked Type) or equivalent

7.1.1 Pin Assignment

Pin#	Signal Name	Pin#	Signal Name
1	RxOIN0-	2	RxOIN0+
3	RxOIN1-	4	RxOIN1+
5	RxOIN2-	6	RxOIN2+
7	GND	8	RxOCLKIN-
9	RxOCLKIN+	10	RxOIN3-
11	RxOIN3+	12	RxEIN0-
13	RxEIN0+	14	GND
15	RxEIN1-	16	RxEIN1+
17	GND	18	RxEIN2-
19	RxEIN2+	20	RxECLKIN-
21	RxECLKIN+	22	RxEIN3-
23	RxEIN3+	24	GND
25	NC	26	NC
27	NC	28	VCC
29	VCC	30	VCC



Product Specification

M190PW01 V6 open cell

AU OPTRONICS CORPORATION

8.0 Reliability Test

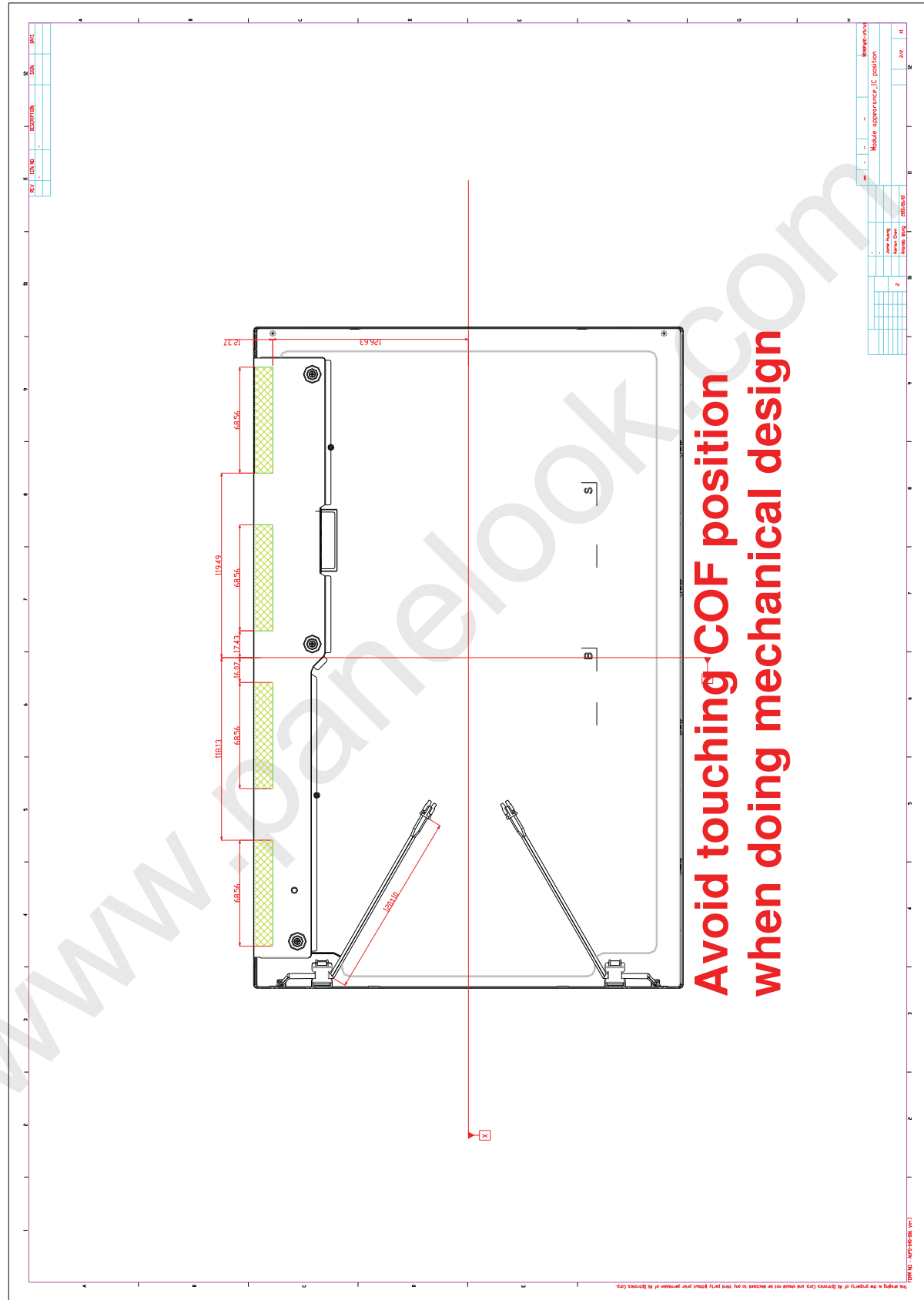
Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50℃, 80%RH, 300hours	
High Temperature Operation (HTO)	Ta= 50℃, 50%RH, 300hours	
Low Temperature Operation (LTO)	Ta= 0℃, 300hours	
High Temperature Storage (HTS)	Ta= 60℃, 300hours	
Low Temperature Storage (LTS)	Ta= -20℃, 300hours	
Vibration Test (Non-operation)	Acceleration: 1.5 Grms Wave: Random Frequency: 10 - 200 Hz Sweep: 30 Minutes each Axis (X, Y, Z)	
Shock Test (Non-operation)	Acceleration: 50 G Wave: Half-sine Active Time: 20 ms Direction: ±X, ±Y, ±Z (one time for each Axis)	
Drop Test	Height: 60 cm, package test	
Thermal Shock Test (TST)	-20℃/30min, 60℃/30min, 100 cycles	1
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (Electro Static Discharge)	Contact Discharge: ± 8KV, 150pF(330Ω) 1sec, 8 points, 25 times/ point.	2
	Air Discharge: ± 15KV, 150pF(330Ω) 1sec 8 points, 25 times/ point.	
Altitude Test	Operation:10,000 ft Non-Operation:30,000 ft	

Note 1: The TFT-LCD module will not sustain damage after being subjected to 100 cycles of rapid temperature change. A cycle of rapid temperature change consists of varying the temperature from -20℃ to 60℃, and back again. Power is not applied during the test. After temperature cycling, the unit is placed in normal room ambient for at least 4 hours before power on.

Note 2: EN61000-4-2, ESD class B: Certain performance degradation allowed
No data lost
Self-recoverable
No hardware failures.

9.0 Mechanical Characteristics



Ver 1.4